

**The Hydrogeologic Framework of Marion County, Indiana:  
A Digital Atlas Illustrating Hydrogeologic Terrain and Sequence**

edited by [Steven E. Brown](#) and [Andrew J. Laudick](#)

INDIANA UNIVERSITY  
INDIANA GEOLOGICAL SURVEY OPEN-FILE STUDY 00-14

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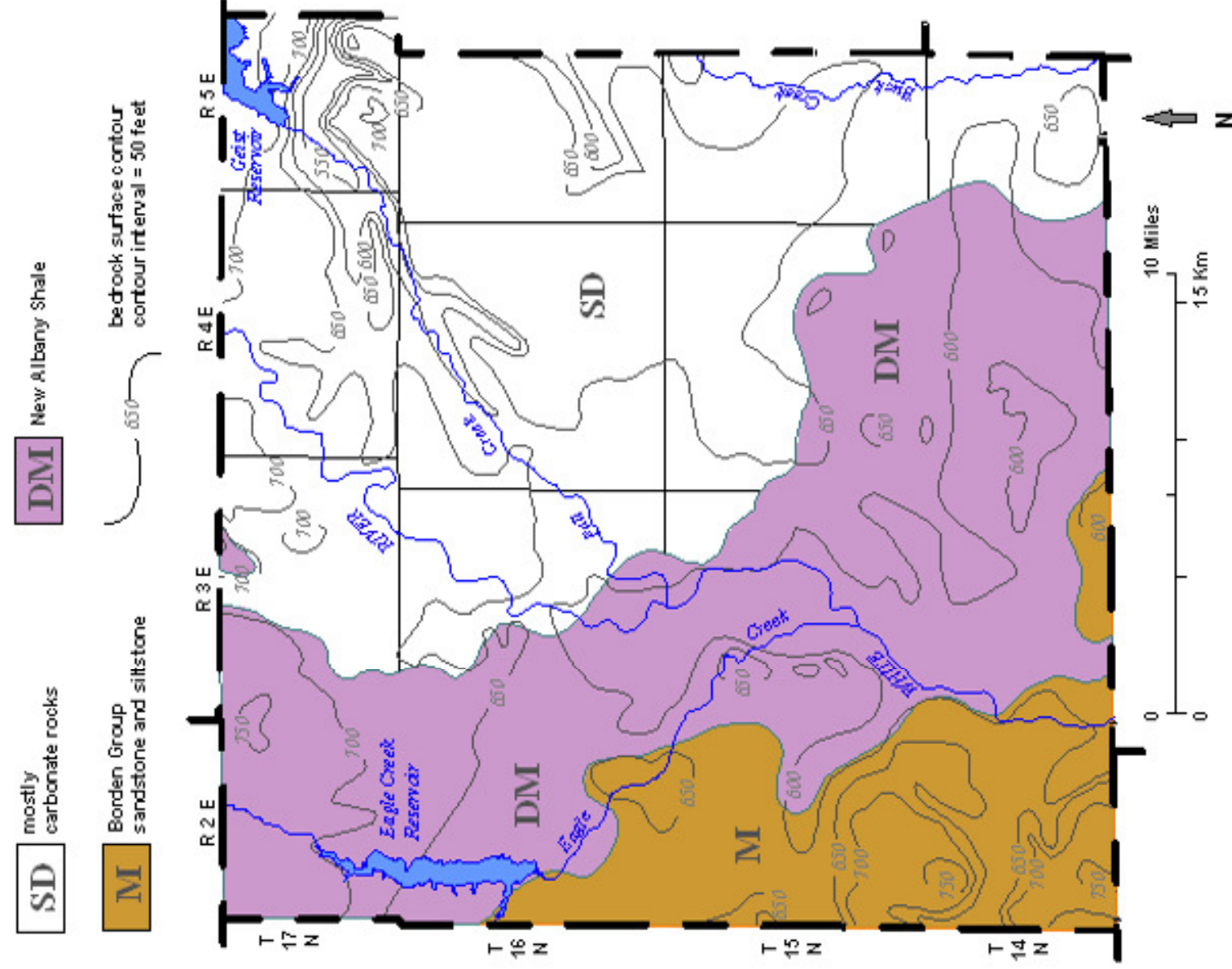


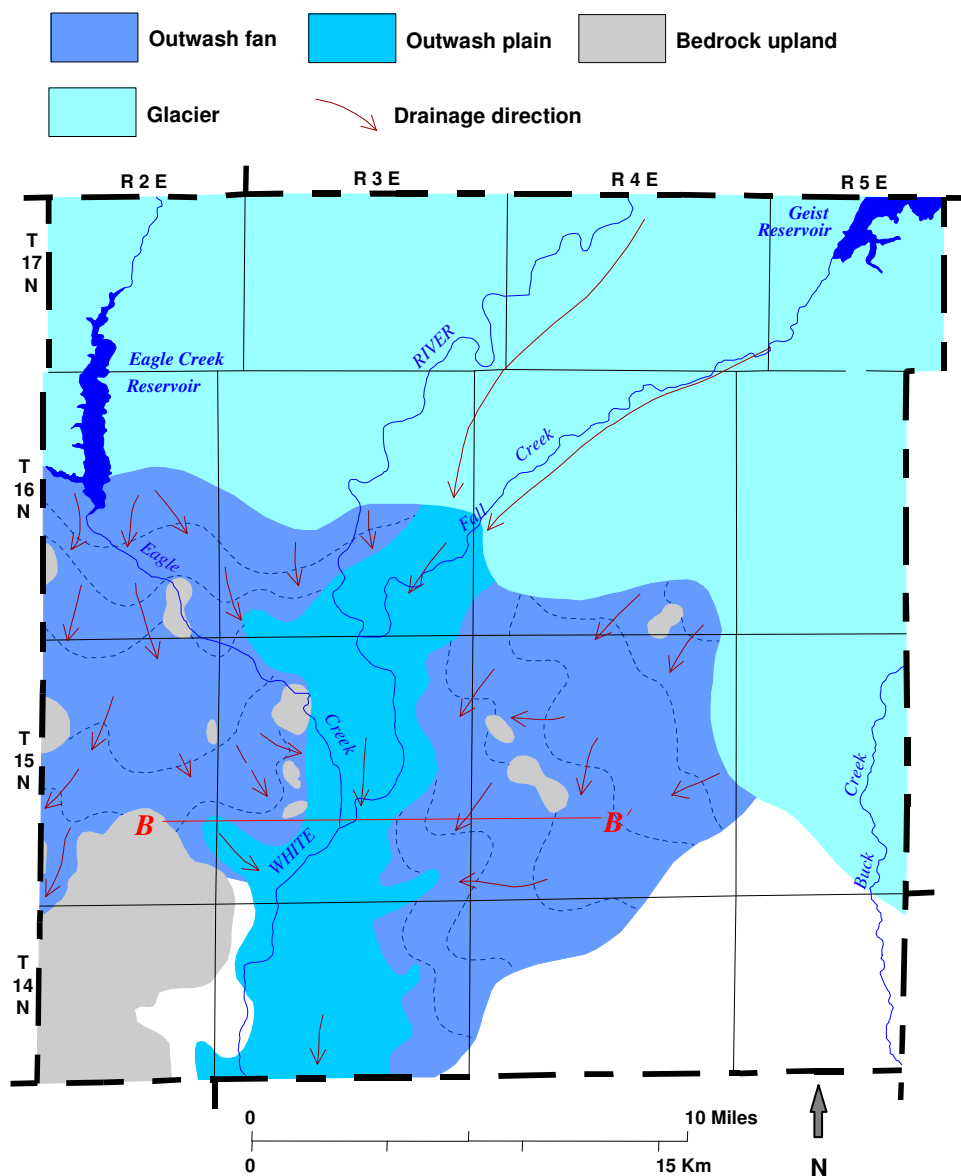
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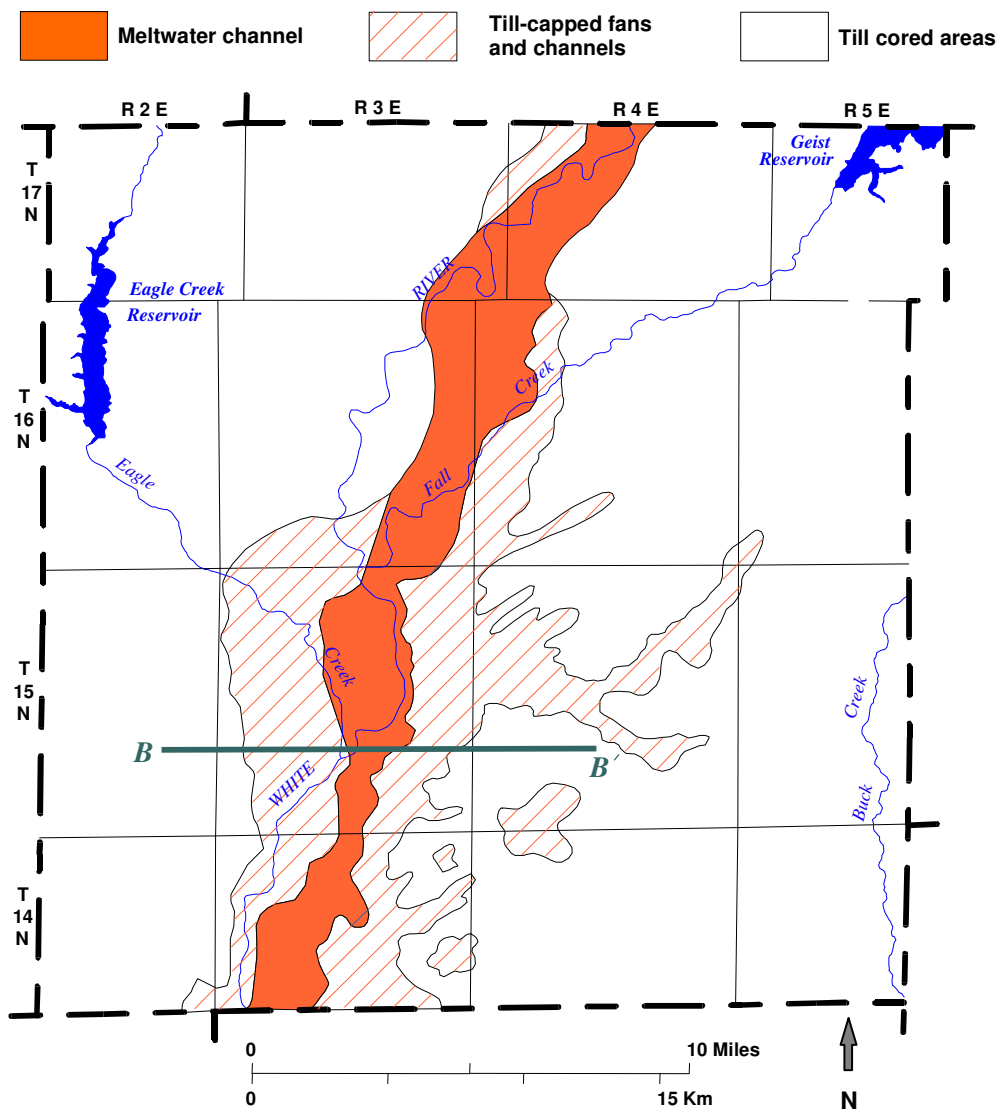


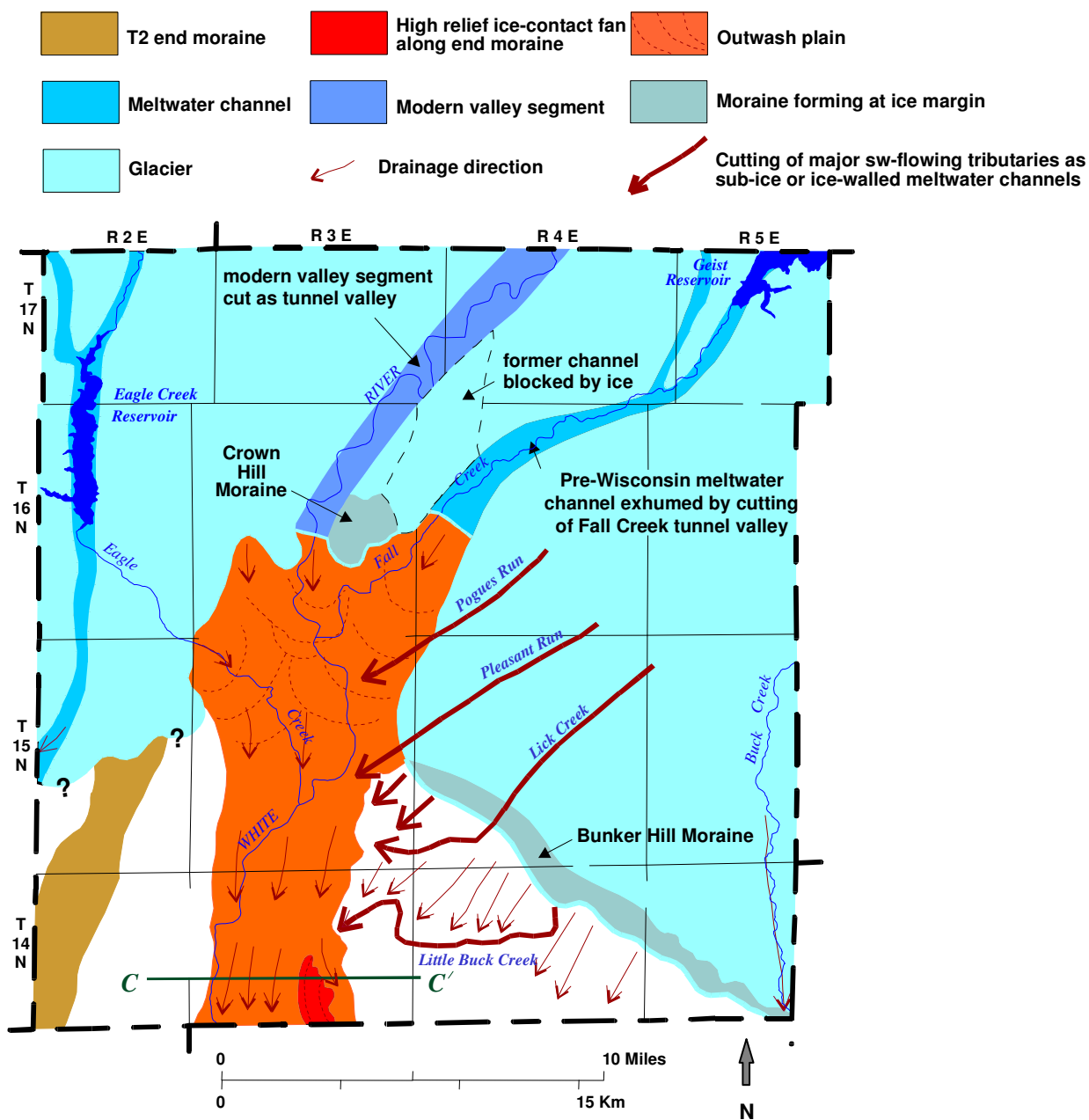
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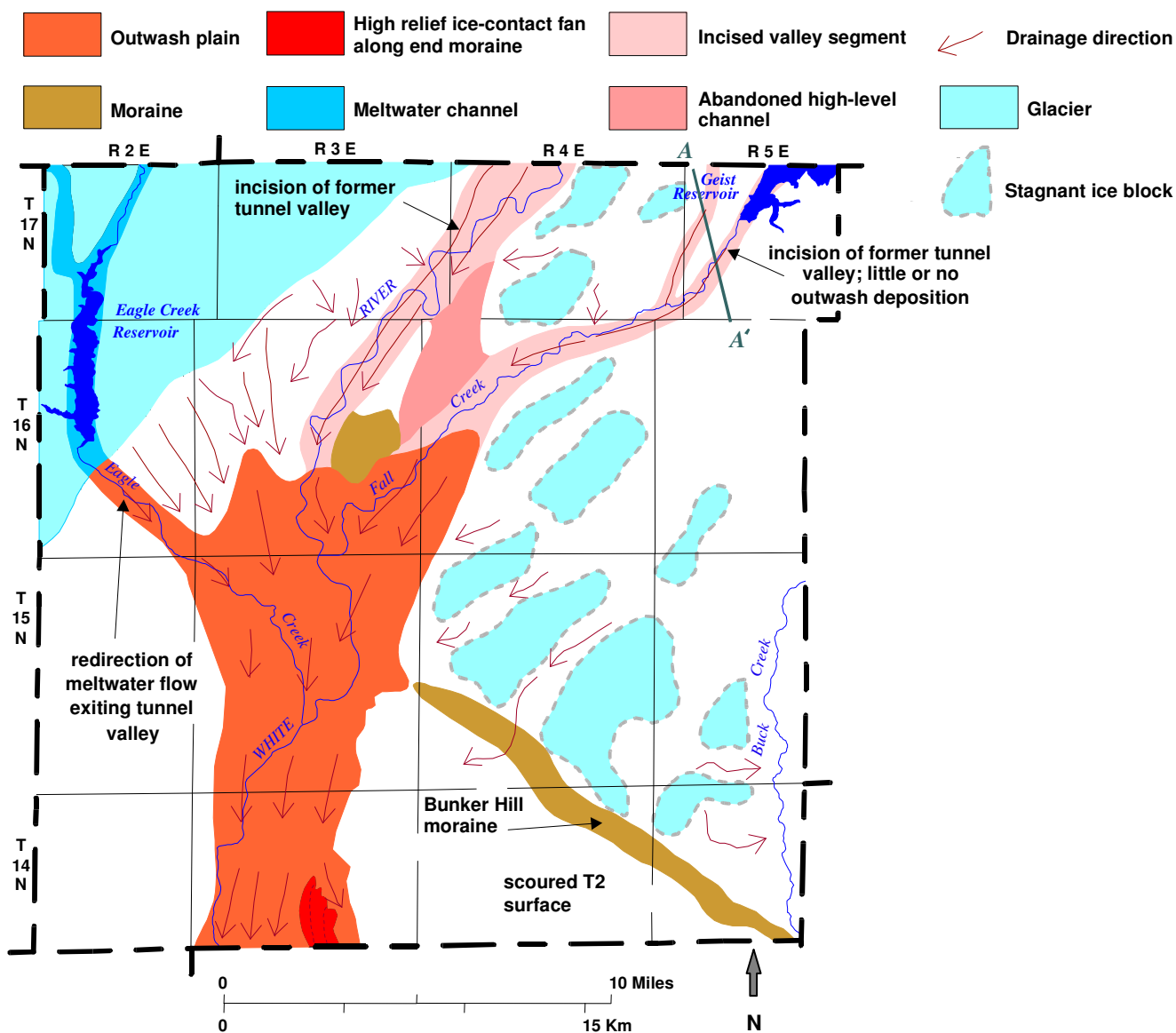
Figure 14. BEDROCK TOPOGRAPHY AND GEOLOGY, MARION COUNTY, INDIANA



**Figure 21a. MIDDLE ILLINOIAN OUTWASH DEPOSITION**[<< Previous map](#)   [Next map>>](#)Click [here](#) for Figure 21b: Cross section B-B'

**Figure 28a. DISTRIBUTION OF T1 FANS**[<< Previous map](#)   [Next map>>](#)Click [here](#) for Figure 28b: Cross section B-B'

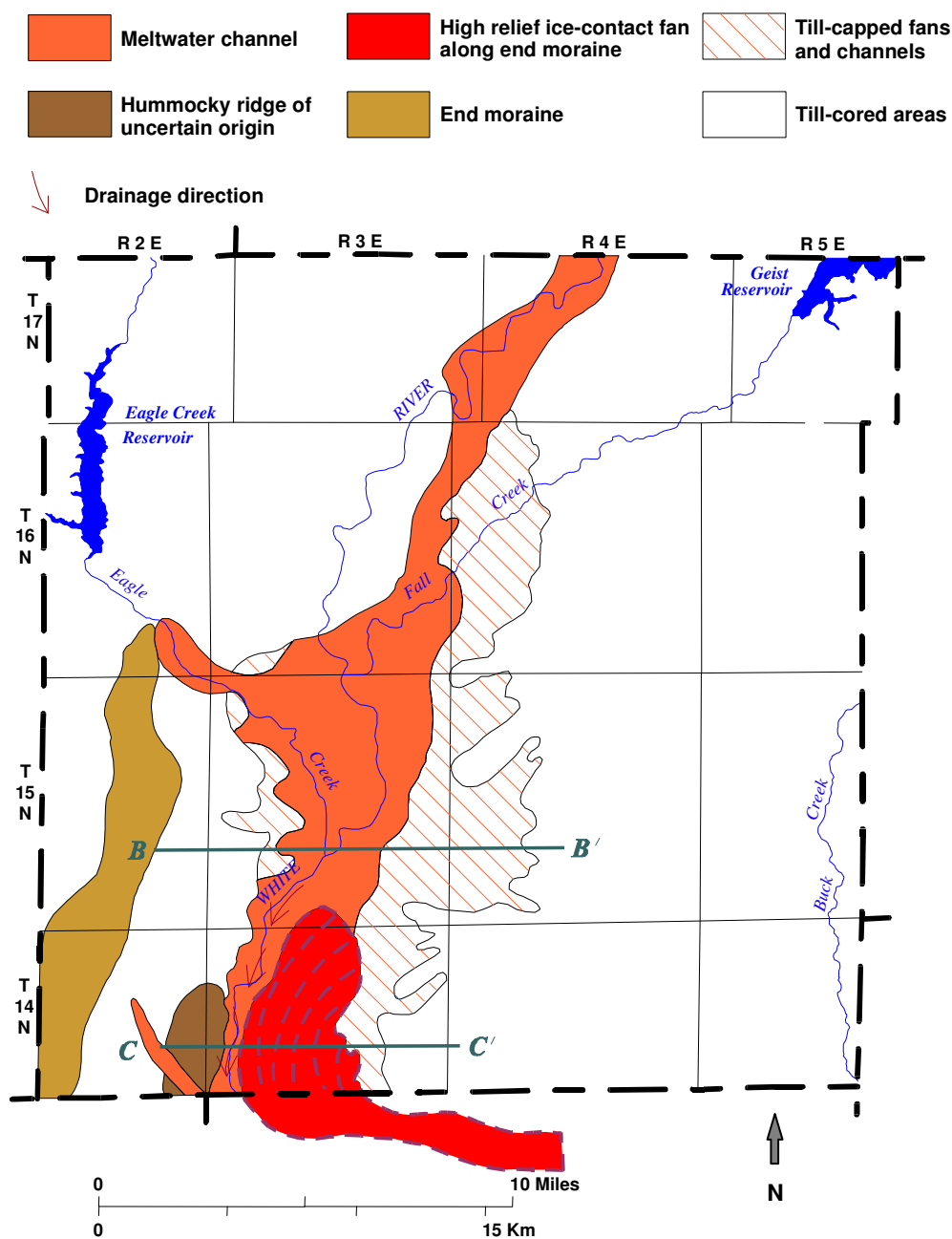
**Figure 31a. T3 EVENTS: THE FINAL SHAPING OF MODERN DRAINAGE**[<< Previous map](#) [Next map>>](#)Click [here](#) for Figure 31b: Cross section C-C'

**Figure 32a. T3 EVENTS: THE FINAL SHAPING OF MODERN DRAINAGE**[<< Previous map](#)Click [here](#) for Figure 32b: Cross section A-A'

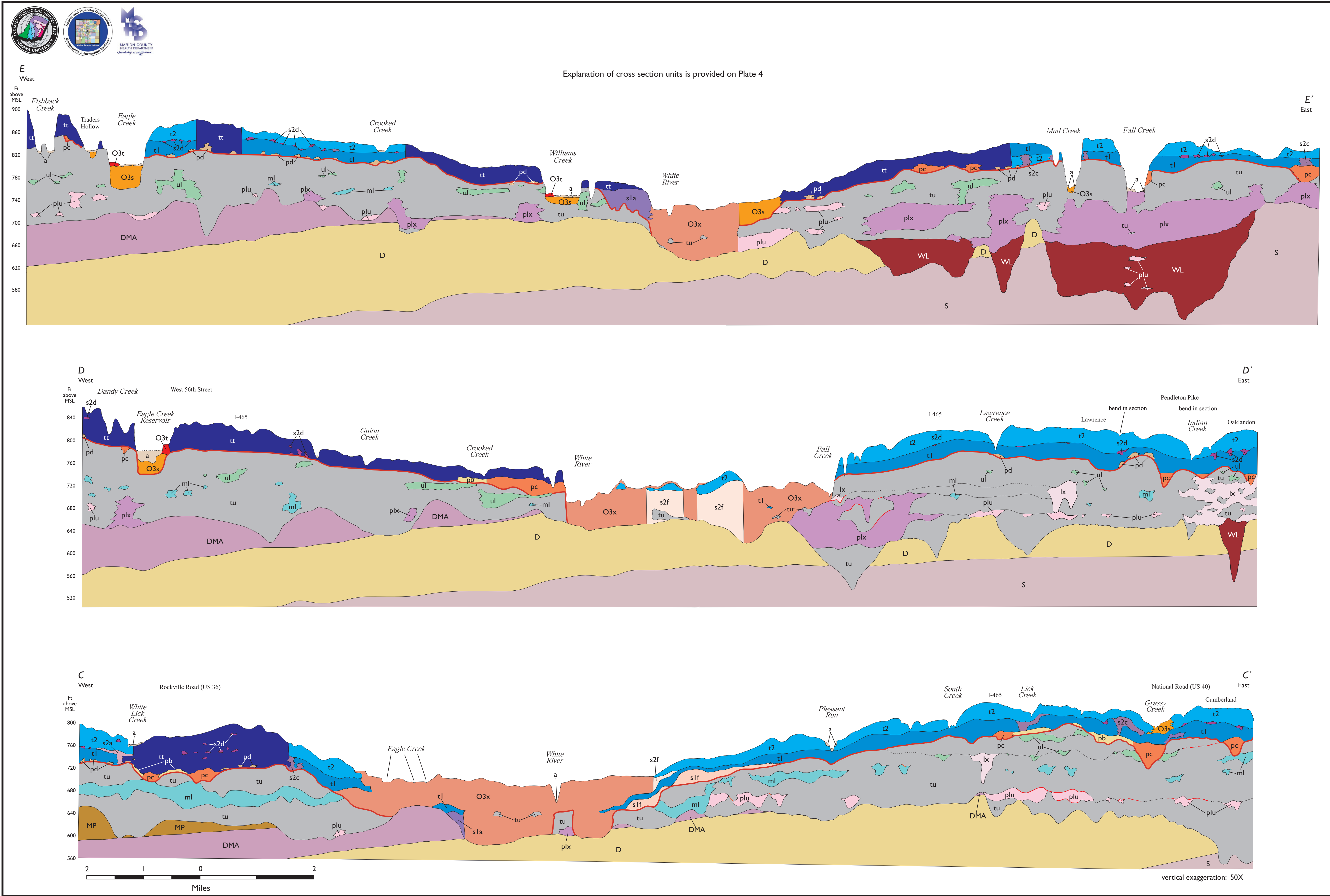
**Figure 30a. DISTRIBUTION OF T2 FANS**

[<< Previous map](#)   [Next map>>](#)

Click [here](#) for Figure 30b: Cross section B-B'







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Hydrogeologic Framework of Marion County, Indiana  
Geologic Cross Sections  
by  
Steven E. Brown and Anthony H. Fleming  
2000

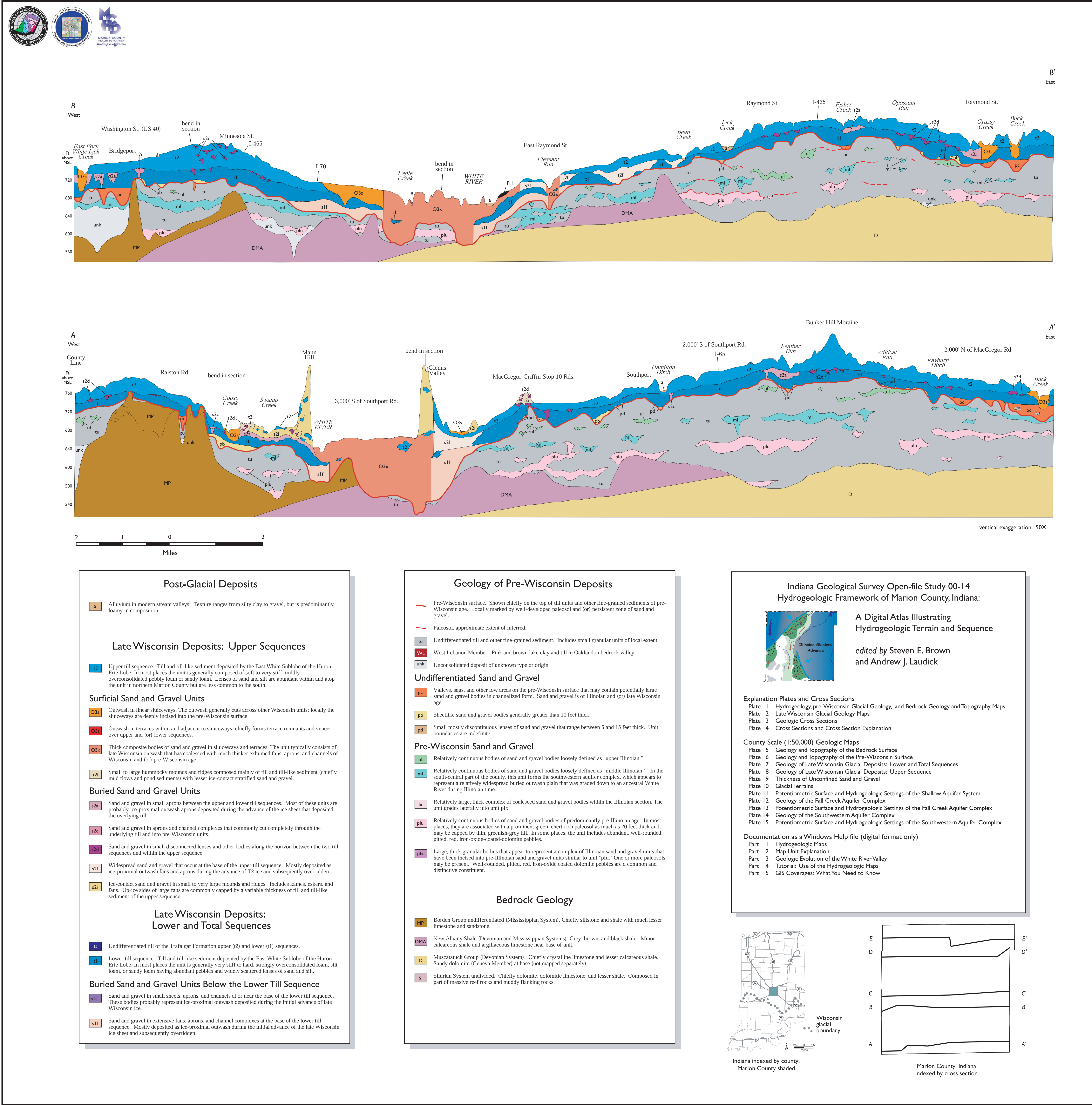
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John C. Steinmetz, State Geologist

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OPEN-FILE STUDY 00-14, PLATE 4 OF 15

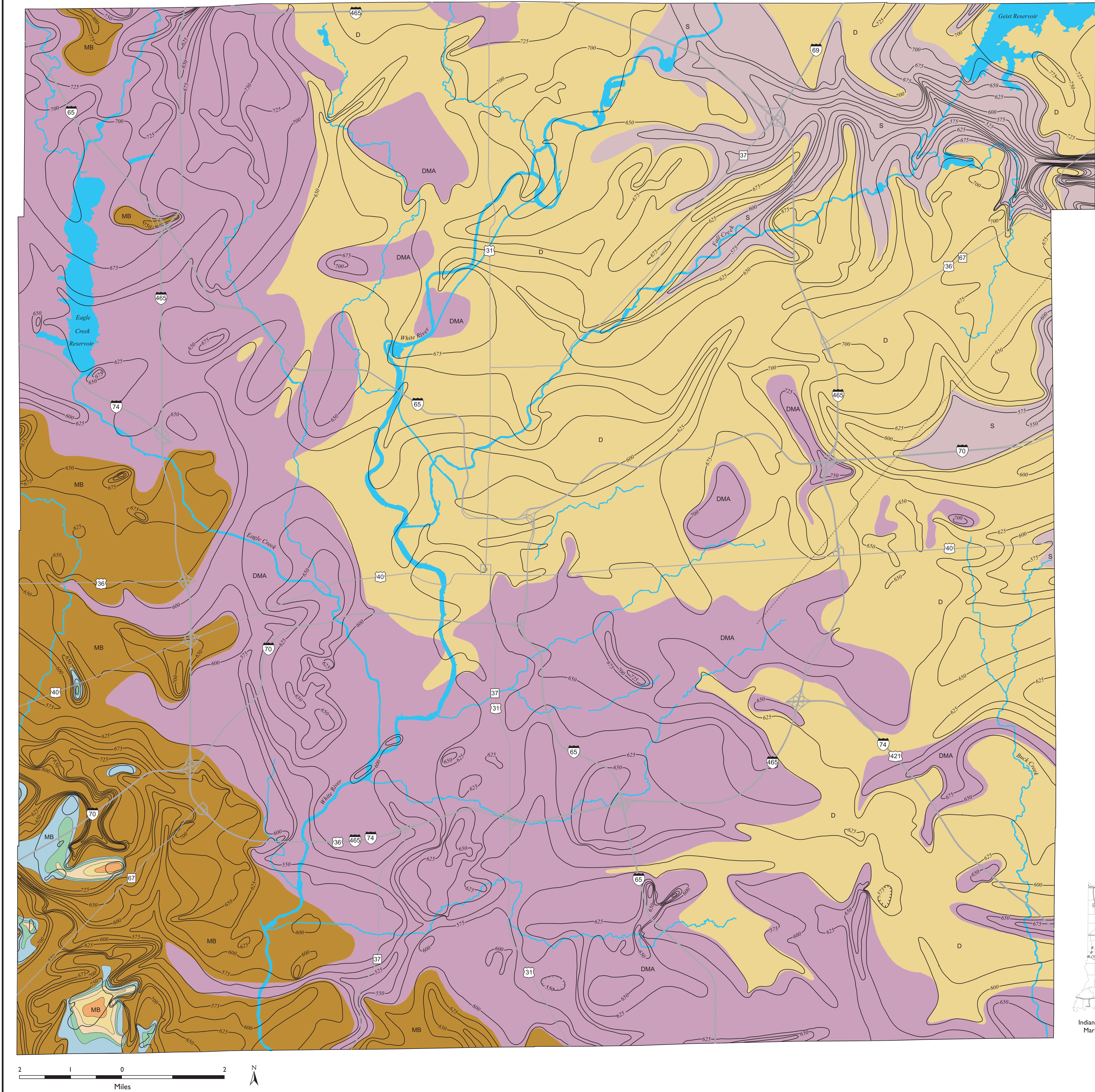


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Hydrogeologic Framework of Marion County, Indiana  
Cross Sections and Cross Section Explanation  
by  
Steven E. Brown and Anthony H. Fleming  
2000

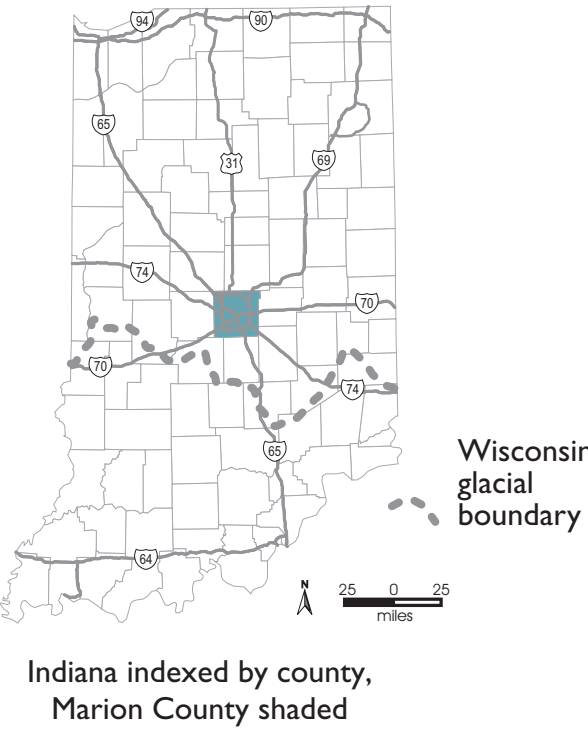
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Explanation

- MB** Borden Group undifferentiated (Mississippian System). Chiefly siltstone and shale with much lesser limestone and sandstone. Colors (below) depict the thickness in 20-foot intervals of sections composed chiefly of sandstone that occur along the bedrock surface in southern Decatur Township (Bridgeport Quadrangle).
- Thickness ranges (feet) of sandstone in the Borden Group along the bedrock**
- |        |         |         |         |          |
|--------|---------|---------|---------|----------|
| 1 - 20 | 20 - 40 | 40 - 60 | 60 - 80 | 80 - 100 |
|--------|---------|---------|---------|----------|
- DMA** New Albany Shale (Devonian and Mississippian Systems). Grey, brown, and black shale. Minor calcareous shale and argillaceous limestone near base of unit.
- D** Muscatatuck Group (Devonian System). Chiefly crystalline limestone and lesser calcareous shale. Sandy dolomite (Geneva Member) at base (not mapped separately).
- S** Silurian System undivided. Chiefly dolomite, dolomitic limestone, and lesser shale. Composed in part of massive reef rocks and muddy flanking rocks.
- Line of equal elevation on the bedrock surface. Hachured lines enclose depressions or sinkholes. Contour interval: 25 feet.
- Fault approximately located. Bars on downthrown side.



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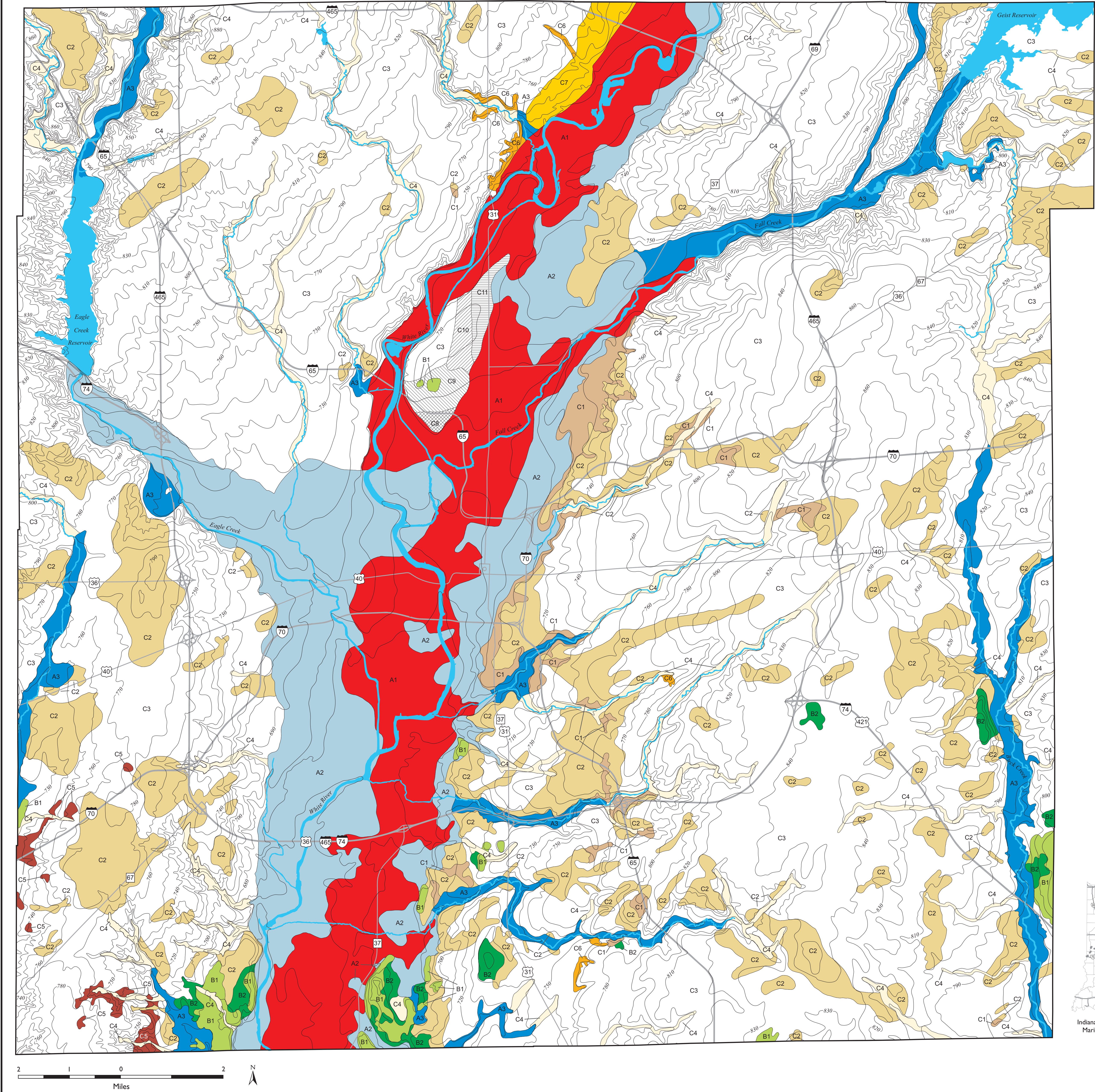
Plate 5 of 15 Scale 1:50,000

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Hydrogeologic Framework of Marion County, Indiana  
Geology and Topography of the Bedrock Surface  
by  
Victoria R. Ferguson  
2000

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Explanation

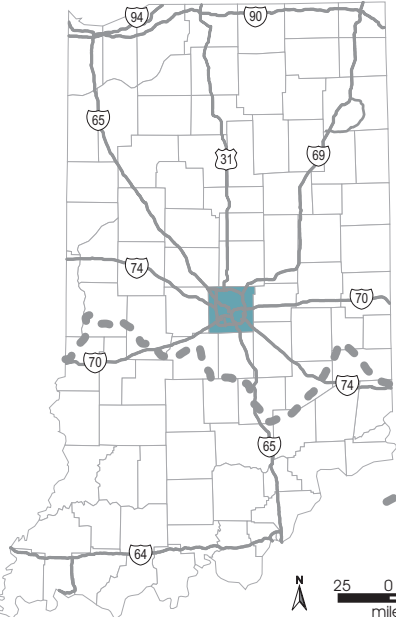
Potentiometric Surface

Generalized contour representing line of equal static water level elevation in the shallow aquifer system associated with the pre-Wisconsin surface and overlying Wisconsin deposits. Contour interval: 10 feet.

Hydrogeologic Settings

- A1** Thick sections of unconfined sand and gravel interstratified with a few small widely scattered till units. This setting characterizes the axis of the White River Valley, which is the regional discharge area for all aquifers in the county.
- A2** Variable thickness of outwash overlying complexly interbedded sand and gravel and till. Thick unbroken sections of sand and gravel are present locally. Sand and gravel units at depth are typically confined or semi confined by bodies of till, whereas the upper portions of the system are commonly unconfined.
- A3** Similar to setting A2 but occurs in narrow bands along the valleys of the larger streams that cross upland areas away from the White River. The potentiometric surface slopes strongly into the valley axis.
- B1** Hummocky ridges and mounds composed chiefly of sand and gravel locally having an irregular cover of till and some lenses of till within. Generally characterized by steep surface topography and large local relief.
- B2** Hummocky ridges and mounds composed chiefly of till-like sediment interbedded with lesser sand and gravel. The granular units locally form thick but narrow channels. Generally characterized by moderate to steep surface slopes, slowly permeable soils, and moderate to large local relief.
- C1** Relatively continuous bodies of sand and gravel along the horizon between the upper and lower sequences (see Plate 2) and capped by less than 10 feet of locally discontinuous till.
- C2** Similar to setting C1 but the sand and gravel is consistently confined by upper sequence till greater than 10 feet thick and commonly more than 20 feet thick.
- C3** Thick sections of Wisconsin till that locally contain a few small widely scattered lenses of sand and gravel. May or may not overlie granular material along the pre-Wisconsin surface. This setting is widespread on uplands.
- C4** Valleys of small upland streams formed chiefly in till locally having exhumed sand and gravel in valley floor. Some alluvium is usually present in floodplains.
- C5** Uplands and small stream valleys in southwestern Marion County characterized by less than 20 feet of glacial sediment over sandstone of the Borden Group. This setting occurs over relatively limited areas but may form localized recharge areas for the sandstone, which is the principal shallow aquifer in that part of the county.
- C6** Dissected areas along small upland stream valleys where less than 20 feet of late Wisconsin sediments overlie sand and gravel along the pre-Wisconsin surface. This setting occurs over very limited areas, many of which are too small to show at the map scale.
- C7** Dissected slope on west side of White River north of Williams Creek characterized by 10 to 20 feet of late Wisconsin till overlying an apron of sand and gravel. The thickness of sand and gravel is typically 20 to 40 feet but ranges from 10 to 60 feet. The till cap is thin or absent where dissected by streams. A lateral hydraulic connection exists between the sand and gravel apron and unconfined sand and gravel in the adjacent White River Valley.
- C8, C9, C10, C11** Hydrogeologic settings C8, C9, C10, and C11 all occur in areas of very sparse or no subsurface data. Consequently, the hydrogeologic behavior of these areas is uncertain. Based on better-known characteristics of nearby areas that appear similar, they are thought to resemble one or more other settings in certain respects. The explanation for setting C8, for example, indicates that the setting may be the same as, or act somewhat like, setting C2, C1, or A2. Therefore, the hydrogeologic behavior of small areas or environmental sites within these settings should be evaluated in the context of local subsurface data.

Map unit	Water table (general; feet below surface)	Recharge/Discharge	Recharge potential	Sensitivity to contamination
A1	5 to 20	regional discharge area	very high for shallow unconfined units	very high
A2	10 to 25 (unconfined)	regional discharge for deep aquifers; local recharge for shallow aquifers	very high for shallow parts of the system	deep confined units—low shallow unconfined—high
A3	5 to 20	local discharge	very high for shallow parts of the system	high to moderately low
B1	greater than 50	local recharge	high	high
B2	25 to 75; locally perched	local recharge	moderate to high	low to moderate
C1	less than 10	local recharge	moderate; higher in depressions	deep confined units—low shallow unconfined—high
C2	within a few feet of land surface	local recharge	low	low
C3	less than 10	local recharge	low	low
C4	same as surface water bodies	local discharge	low	low
C5	greater than 25; locally perched	local recharge	moderate	low to high
C6		recharge and discharge	moderate	moderate
C7	greater than 10 feet below till-confining unit	local recharge	moderate to high	moderate to high



Indiana indexed by county, Marion County shaded

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Plate 11 of 15 Scale 1:50,000

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**Table 2a.** Caption

Map unit	General Description	Degree of Confinement	Rate of Surface Infiltration	Thickness of Vadose Zone (feet)
<b>A1</b>	Thick sections of sand and gravel interstratified with a few, small, widely scattered till units; White River Valley axis	Unconfined	High	5-20
<b>A2</b>	Variable thickness of sand and gravel overlying complexly interbedded sand and gravel and till White River Valley margins	Unconfined to semi-confined	High	10-25
<b>A3</b>	Similar to setting A2 but occurs in very narrow bands along the larger streams that cross uplands	Unconfined to semi-confined	High	5-20
<b>B1</b>	Hummocky ridges and mounds composed chiefly of sand and gravel, locally with thin till cap and some lenses of till within; south-central part of county	Unconfined to semi-confined	Moderately high	50-100
<b>B2</b>	Hummocky ridges and mounds composed chiefly of till and lesser sand and gravel in thick, narrow channels; widely scattered	Semi-confined to confined	Low to moderate	25-75*
<b>C1</b>	Mapped bodies of late Wisconsin sand and gravel capped by less than 10 feet of till; uplands throughout county	Semi-confined	Low to moderate	<10
<b>C2</b>	Similar to setting C1 but the till cap is typically greater than 10 feet thick; uplands throughout county	Mostly confined	Low	<10*
<b>C3</b>	Thick sections of till, locally with small lenses of sand and gravel; uplands throughout county	Well confined	Low	<10*

**Table 2b** Caption

Map unit	General Description	Position in Flow System	Predominant Hydraulic Gradient	Recharge Potential
<b>A1</b>	Thick sections of sand and gravel interstratified with a few, small, widely scattered till units; White River Valley axis	Regional discharge area for all aquifers	Gentle lateral; upward gradient near river in deeper part of system	Very high***
<b>A2</b>	Variable thickness of sand and gravel overlying complexly interbedded sand and gravel and till White River Valley margins	Regional discharge area for most pre-Wisconsin aquifers. Recharge area for shallow aquifer system	Gentle lateral for unconfined aquifers; upward for deeper aquifers	Very high***
<b>A3</b>	Similar to setting A2 but occurs in very narrow bands along the larger streams that cross uplands	Local discharge area for shallow aquifer system and some deeper units**	Gentle lateral for unconfined aquifers; upward for deeper aquifers	High***
<b>B1</b>	Hummocky ridges and mounds composed chiefly of sand and gravel, locally with thin till cap and some lenses of till within; south-central part of county	Local recharge area for shallow aquifer system	Downward	Moderately high
<b>B2</b>	Hummocky ridges and mounds composed chiefly of till and lesser sand and gravel in thick, narrow channels; widely scattered	Local recharge area; especially where sand and gravel bodies are abundant	Downward	Moderately low to moderately high
<b>C1</b>	Mapped bodies of late Wisconsin sand and gravel capped by less than 10 feet of till; uplands throughout county	Local recharge area for shallow aquifer system	Downward	Moderate to moderately high
<b>C2</b>	Similar to setting C1 but the till cap is typically greater than 10 feet thick; uplands throughout county	Intermediate, with small, highly localized recharge areas	Downward	Moderately low
<b>C3</b>	Thick sections of till, locally with small lenses of sand and gravel; uplands throughout county	Intermediate	Downward	Low



<b>C4</b>	Valleys of small upland streams, mainly floored by till; upland streams throughout county	Local discharge area for shallow system; seepage area for till	Neutral	Low
<b>C5</b>	Sandstone capped by 0-20 feet of glacial sediments; southwest part of county	Local recharge area for sandstone	Downward	Moderate
<b>C6</b>	Pre-Wisconsin sand and gravel capped by less than 20 feet of till; upland slopes and stream valleys throughout county	Local recharge or discharge area for shallow sand and gravel; seepage area for till**	Variable	Low to moderate
<b>C7</b>	Apron of late Wisconsin sand and gravel capped by 10-20 feet of discontinuous till. West side of White River north of William's Creek	Local recharge area for shallow sand and gravel	Strong lateral	Moderate to moderately high

Notes    \*\*considerable interchange between surface water and ground water is possible in some places  
             \*\*\*for unconfined parts of system

<b>C4</b>	Valleys of small upland streams, mainly floored by till; upland streams throughout county	Mostly confined	Low	<5*
<b>C5</b>	Sandstone capped by 0-20 feet of glacial sediments; southwest part of county	Unconfined to semi-confined	Low to moderate	20-40*
<b>C6</b>	Pre-Wisconsin sand and gravel capped by less than 20 feet of till; upland slopes and stream valleys throughout county	Semi-confined to confined	Low to moderate	0-15
<b>C7</b>	Apron of late Wisconsin sand and gravel capped by 10-20 feet of discontinuous till. West side of White River north of William's Creek	Semi-confined	Low to moderate	20-30

Note    \*perched water table possible in till or on bedrock surface (unit C5)

Table 2b click [here](#)